REMARKS

Claim Status, Amendments and Support

Claims 1-35 were originally presented, while claims 10-22, 26-28 and 31-34 were previously withdrawn due to restriction requirement and election. Claim 35 was previously canceled. Claims 1-9, 23-25, and 28- 30 were under examination as of the Office Action dated April 26, 2011. **Note** claim 28 was rejoined by the Office in the Office Action of November 12, 2010, which was not reflected in the *Disposition of the Claims* section of the *Office Action Summary* of April 26, 2011 although claim 28 was considered on the merits. Claims 1-9, 23-25, and 28- 30 are therefore pending.

In the office action dated April 26, 2011, the Office took the following actions:

1. Claims 1-9, 23-25, and 28-30 were rejected as obvious under 35 USC, § 103 over Grossmann et al (*Carbohydrate Polymers 45, 2000, 347-353)* as evidenced by Sigma Aldrich (PTO-892) in view of Hirsch et al (*Cereal Chemistry, 2002)* and further in view of Feil (EP 0900807), which were the same references cited for rejection of the prior claims, the rejection being modified in response to Applicant's last amendment.

2. Claims 1, 3-9, 23-25, 28 and 29 were provisionally rejected for non statutory type double patenting over claims 7, 15, 26 and 50 of copending application No. 10/422,881.

3. Claims 1, 4-6, 23-25 and 28-30 were provisionally rejected for non statutory type double patenting over claims 7, 15, 26 and 50 of copending application No. 11/765,859.

4. Claims 1-9, 23-25 and 28-30 were provisionally rejected for non statutory type double patenting over claims 7, 15, 26 and 50 of copending application No. 10/953,873.

5. Claims 1-9 and 23 were provisionally rejected for non statutory type double patenting over claims 7, 15, 26 and 50 of copending application No.11/814,653.

Applicants request the Office reconsider these grounds of rejections in view of the enclosed declaration and following Remarks.

Obviousness Rejection

In the Office Action of April 26, 2011 the Office rejected the formerly amended claims as obvious over the same references for the same reasons the original claims were rejected in the prior Office Action of November 12, 2010. In addition to a claim amendment filed in response,

Applicant's presented technical arguments believed sufficient to demonstrate the amended claims were not obvious over the art of record because nothing in the cited art suggests that extruded starch having at least 90% amylopectin content would have the FSC and CRC values recited in the amended base claim.

In response to Applicant's arguments, in the Office Action of April 26, 2011, the Office took the position that the FSC and CRC values appear to be latent properties of the product described by Grossmann, and stated that the Applicant has not provided any evidence that the actual product taught by Grossmann would not have the claimed FSC or CRC properties.

Applicants accordingly repeat the substance of the prior arguments and submit herewith a Declaration under § 1.132 of Fred Picard, providing evidence to support the contention that extruding ordinary starch as taught by Grossman even with use of the same cross linking agent, would not obtain the FSC and CRC recited in the base claim. Reconsideration of Applicant's arguments presented here again, is therefore earnestly requested.

Base claim 1 recites the absorbent particles made of entangled starch network derived from extrusion of starch having at least 90% amylopectin also must have a particle diameter of 89- 589 μm and further that they exhibit a FSC of at least 13 g/g and a CRC of at least 10 g/g using a 0.9% saline solution. These are critical functional requirements that have been determined by Applicant's tedious experimentation to produce results that cannot fairly be said to be obvious over the art of record.

In particular, the Office is invited to inspect the data in tables 7 and 8, which show that for either cross-linked or non cross linked extruded high amylopectin starch, particles having a size greater than 589 μm, or those having a particle size of less than 89 μm each failed to deliver the combination of both the required FSC and CRC values. FSC and CRC are critical functional parameters in the absorbent industry, because if the particles cannot absorb at least 13 times their weight of saline fluid and retain at least 10 times their weight in the centrifuge test, then such particles derived from a renewable resource such as starch, will not be suited for displacing non renewable petroleum based polyacrylate superabsorbent particles (SAPs) in the absorbent industry because conventional SAPs demonstrate at least this level of performance.

The cited art does render the present combination claims obvious at least because Applicants' invention is in the context of a specific problems with specific solutions, while the references, which were cited for disclosing different elements of the present claims, were written

for different contexts. The problem being addressed by the present invention is how to formulate a particle from a starch that can be used as a substitute for SAPs derived from polyacrylates. One component of the solution is recognizing that high amylopectin starch – waxy starch - when prepared as pregelatinized or post gelatinized particles can absorb more fluids than other types of starch (e.g., cassava or other ordinary i.e., amylose containing starch). Another component of the solution was discovering that pregelatinized or post gelatinized particles can be made efficiently using an extruder which provides shear forces and temperature conditions that cause the naturally highly branched amylopectin to become further intertwined in a starch network. Yet another component of the solution was in discovering that the particle size distribution for such particles must be delimited on both the high and low ends to obtain particles with a FSC of at least 13 g/g and a CRC of at least 10 g/g.

In contrast, the teaching of Grossmann, which was cited for the proposition that starch can be cross linked in an extruder, was concerned with the problem of making a specialty food ingredient from cassava starch which was known to have negative characteristics such as long texture, sensitivity to shear, high temperature and low pH (first paragraph Introduction). Grossmann's solution to that problem was to use an extruder to perform a cross-linking reaction with trisodium metaphosphate to form a cross linked cassava starch product. The starch used was ordinary cassava starch obtained from Brazil (materials and method first paragraph). One of ordinary skill in the art understands that ordinary cassava starch is not waxy starch containing at least 90% amylopecitin but is typical of ordinary starches being composed of 17-28% amylose (see for example (*Functional Properties of Starch*, M. Satin, *FAO Agricultural and Food Engineering Service*, Table 2, attached with the 1.132 declaration). The water absorption index (WAI) and viscosity properties of a paste of the cross linked material were measured (see Table 2 and section 3.3 of Grossman). An increase in viscosity and WAI were viewed as positive characteristics for the starch as a food product. Nothing in the data or text of this reference, however, teaches anything that would lead one of ordinary skill in the art of absorbent materials to believe that the cross linked starch extruded according to Grossman would have the properties needed to form an absorbent particle with a free swell capacity to absorb at least 13.g/g of a saline solution. Moreover, the attached declaration under § 1.132 provides evidence that ordinary starch subject to reactive extrusion including cross linking with trimetaphosphate does not alone

produce a material that would form a particle having a FSW of at least 13 g/g and a CRC of at least 10 g/g. Other factors are required.

Hirsh does not cure the deficiency of the teaching of Grossmann with respect to the use of an extruder to form an entangled starch network of waxy starch to form a starch particle that has the recited absorbent properties. The context of Hirsh is the mechanism of cross linking. The reference merely presents data concerning the properties of waxy starch that has been subject to cross linking reactions with phosphorous oxychloride, sodium trimetaphoshpate or epichlorohydrin. The data in the reference merely discloses numbers for was already known in the art, *i.e.,* that cross linking any starch increases the swelling ability of starch granules. Nothing in the data however, would make it obvious to use cross linked amylopectin to form an absorbent particle that would have a FSW of at least 13 g/g and a CRC of at least 10 g/g. let alone that using an extruder to form such a cross linked amylopectin would improve absorbent properties only if the starch particles are in the range of 89 μm to 589 μm in size. This is Applicant's empirical discovery, not something that can reasonably be considered as obvious from the teaching of Hirsh and Grossman.

Feil was cited as teaching that water absorbing cross linked starch can be used as an ingredient to form absorbent materials. Applicants admit that it was known in the art at the time of filing that as taught by Hirsh and Grossman, that cross linked starches have higher water absorbent properties than non cross linked starches. Feil adds nothing more to this understanding other than the observation that particles of 300-400 um size had an absorption capacity (FSC) of 12/g/g of 0.9% saline (Column 5, lines 25-32 and 48-51). Nothing in Feil, alone or in combination with Grossmann and Hirsh would make it obvious that the absorption capacity could be increased by using at least 90% amylopectin as the starting starch source, or that use of an extruder to entangle the amylopecitn starch fibers into a network would increase the FSC and CRC properties of starch particles having a dimension of 89 μm to 589 μm. Again, this is an understanding gleaned from Applicant's invention, which is not suggested and cannot otherwise be said to be an obvious conclusion that one of ordinary skill in the art would draw from reading the combination of Feil, Hirsh and Grossmann.

Accordingly, nothing in the cited art taken together as a whole can be said to teach the desirability of processing a high amylopectin starch through an extruder to produce an absorbent particle having the recited minimum absorbency parameters. Moreover, nothing the combined

art makes is predictable that high amylopectin starch would perform any differently with respect to absorbency than ordinary extruded starch subject to extrusion. Grossmann subjected ordinary cassava starch to extrusion to determine its properties as a food. Applicant's declaration provides evidence that ordinary starch subject to extrusion with cross linking (which Feil teaches improves absorbency properties) still does not provide a particle with the recited FSC and CRC values. Hence, Applicant's claims cannot be considered an obvious variation of what was known in the cited art at the time of filing that would yield a predictable result as KSR requires to establish a *prima facie* case of obviousness. Applicants therefore request withdrawal of the rejection of the pending claims on this ground.

Obviousness Type Double Patenting Rejections

Applicant's respectfully traverses each of the rejections on grounds of obviousness type double patenting.

The essential inventive component of the present claims is the discovery that high amylopectin starch subject to intertwining by extrusion and further grinding to come within a particular range of particle sizes could, in and of itself, act as superabsorbent material having a FSC of at least 13 g/g and a CRC of at least 10 g/g for a solution of 0.9% saline. Nothing in Applicant's co-pending applications would make this discovery obvious, nor would support a claim drawn to such a discovery.

Application No. 10/422,881, now US 7,985,742 has claims drawn to synergistic, multicomponent starch particles comprising mixtures of different types of starches. Some dependent claims therein include waxy starch as one of several other component that can be used, and some relate to the size of the particles. However, these claims all depend on the larger multi-component features of the base particle. Nothing in those claims would suggest or render obvious the present independent base claim, and therefore cannot render the present dependent claims obvious.

Application No. 11/765,859 has claims drawn to process of extruding polysaccharides using a particular type of esxtruder that cause particular affects on the polysaccharide. Some dependent claims recite that the polysaccharide may be waxy starch. Nothing in that application

nor in the claims, makes it obvious that extruding waxy starch per se, would result in a product having the absorbency characteristics recited in the present claims.

Application No. 10/953,873 is drawn to a nanocomposite material comprising delaminated phyllosilicates combined with polysaccharides. Some of the dependent claims recite that the polysaccharide may be waxy starch. Again, nothing in that application nor in the claims, makes it obvious that extruding waxy starch would result in a product having the absorbency characteristics recited in the present claims.

Application No. 11/814,653 is drawn to additive comprising a composite partice fro discrete blending with a superabsorbent polymer, the composite comprising a polysaccharide and a inter inorganic component, where the polysaccharide component and the inert inorganic component remain distinct. Some of the independent claims recite particle sizes for the composite within the same range as the particle sizes claimed in the instant application, and some of the claims recite that the polysaccharide component may be waxy starch, other dependent claims recite absorbency characteristics similar to recited in the present claims. However, as with each of the other applications cited for obviousness type double patenting nothing in that application nor in the claims, makes it obvious that extruding waxy starch per se, without the sue of the phyllosilicate would result in a product having the absorbency characteristics recited in the present claims.

Accordingly, the scope of the present claims differs from the scope of the claims for each of the references cited for obviousness type double patenting. Not only do the present claims differ in scope, but the content of the specifications for each of the cited applications would not support a claim of the scope recited in present application. The present claims would therefore not have sufficient support in the specification of the cited applications, and cannot be considered obvious variants of the claims pending therein. Withdrawal of the rejection on ground of obviousness type double patenting is therefore respectfully requested.

Summary

With the enclosed amendment all of the rejections are believed to have been rebutted, accommodated or rendered moot. Entry of the amended claims as well as reconsideration and allowance of all of the claims are respectfully requested. If the examiner believes that a

telephone conference might resolve any outstanding issues in this application, he is encouraged to call the undersigned.

Respectfully submitted for Assignee

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